Program Plan for CMU Computer Science and Engineering Building

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EXECUTIVE SUMMARY

Programmatic Justification
This project provides much needed academic teaching and research space at Colorado Mesa University for the rapidly growing Engineering Program, a partnership program with the University of Colorado Boulder, and the Department of Computer Science. The current Engineering Program is housed 3 miles from campus at the Bishop Campus in Grand Junction, requiring students to balance classes both on and off-campus. The new building will:

• provide critically needed state-of-the-art academic facilities designed for the needs of a growing diversity of engineering and computer science programs,
• reassign existing facilities for the growth of certificate and associate level programs currently housed on CMU's Bishop Campus, including academic instruction classrooms, skill development spaces and labs,
• create space to support the growing demand for interdisciplinary program collaboration and student academic and research projects and
• serve as an economic catalyst to support job creation and STEM K-12 education on the Western Slope.

Current facilities on campus are not sufficient to support growth in student enrollment, higher retention rates, expansion of existing programs, increased interest in new programs, night and evening classes and future graduate programs. This program plan defines the new CMU Computer Science and Engineering Building.

In September of 2015, CMU was approached by the local John McConnell Math & Science Center to see if they could partner with the university to co-locate their center with CMU's Engineering and Computer Science Programs. The John McConnell Math & Science Center of Western Colorado is a world-class center that integrates teaching and hands-on excitement into a Science, Technology, Engineering and Math learning environment encompassing students, educators, families and community. Its mission is to create lasting excitement for math and science for students, teachers and community by

• Offering creative hands-on experiences for students
• Developing and providing resources for classroom use
• Providing training for educators and
• Developing innovative programs in science, technology, engineering and mathematics.

CMU therefore plans to incorporate the John McConnell Math & Science Center as a 19,500 sf element of the CMU Computer Science and Engineering Building. Not only will this contribute to CMU’s mission to serve the university’s 14-county region by bringing more math and science to K-12 students through the engagement with sophisticated hands-on experiments and interactive presentations, but it will also provide opportunities for university students to volunteer, mentor and will provide a fantastic avenue for future K-12 teachers to receive hands-on experience.

This project supports several of the University’s goals described in “Achieving a Higher Degree: A strategic Plan and Vision for Colorado Mesa University” and most closely aligns itself with Goal 4 – Facilities & Equipment:

• Improve the campus learning environment by adding appropriate instructional facilities.
• Maintain a balance between open green space and new buildings.
• Expand technology to provide full range of educational services and opportunities for students.

Funding
Colorado Mesa University is requesting $32,805,723 in authority from the State of Colorado to fund the new CMU Computer Science and Engineering Building which will include by a CMU cash match of 28.4% of $9,322,516. The total project budget for the CMU Computer Science and Engineering Building includes:
• $24,211,938 for construction, including building components planned to maximize sustainable design principles and minimize operations and maintenance costs;
• $1,238,656 for land and building acquisition costs;
• $2,215,383 for proposed equipment and furnishings, including telecom equipment;
• $3,863,931 for A/E design, code review, surveys and project management;
• $1,102,500 for required project contingencies; and
• $173,315 (1% of state total construction costs) is included for art in public places.

Project Description
This program plan describes an 87,500 gross square foot new CMU Computer Science and Engineering Building to be located west of Cannell Avenue. The structure projected to be three stories and extend to the southwest corner of east-west mall, an open space area that links academic open spaces with the University Center.

When completed, the CMU Computer Science and Engineering Building will include 10 academic classrooms, 10 labs (a combination of teaching, open and research), academic and administrative support, collaborative work and gathering space, as well as a section of the building to house the John McConnell Math & Science Center of Western Colorado. Using the success of the Wubben Addition to the Science Building, completed in 2010 as a multi-purpose science and allied support building, as a guide, the new CMU Computer Science and Engineering Building will include informal student gathering spaces to augment/extend learning experiences outside of scheduled class time.

In addition to the CMU portion of the building, when completed, the CMU Computer Science and Engineering Building will also have a portion of its space dedicated to the John McConnell Math & Science Center of Western Colorado. The Math & Science Center has evolved from its earliest beginnings as a volunteer effort by John McConnell with one class at Wingate Elementary School. Over a period of nine years, John volunteered his time to teach scientific principles to kids through hands-on demonstrations that he created. The effort quickly became a traveling road show, with John carrying the demonstrations from school to school in the trunk of his car, going out for over 100 miles, with an ever increasing audience. It was during these early years that the project was given the acronym SITHOK, which stands for “Science In The Hands Of Kids”. After reaching about 5,000 students per year from the car, John asked the Mesa Valley School District 51 school administration for space for the math and science center, which they granted. However, the Math & Science Center has now outgrown even this approximately 12,000 sf space. They have therefore approached CMU to co-locate their center with CMU’s Computer Science and Engineering programs in a 19,500 sf space.

The design of the project will incorporate “green construction” techniques aligned with LEED or Green Globes criteria, including use of sustainable materials, optimization of energy efficient mechanical and electrical systems, natural day lighting and operable windows, minimization of water usage and superior standards for air quality. The new CMU Computer Science and Engineering Building will be serviced by the campus-wide geothermal exchange system.

Site
The site has not been finalized but will be in the academic zone of the university on CMU’s main campus. CMU is in final consultation with CU Boulder Engineering faculty and administrators in concert with and in consultation with architects, and the CMU Board and faculty. It will be in the academic zone of the campus and consistent with the University’s Master Plan. (Map of potential sites follows on next page)

Schedule
The program plan for this project will be submitted to the Colorado Department of Higher Education in August 2015. Anticipated spending authority and the appropriated state funding will be included in the Long Bill in May 2016. Site development and construction of the CMU Computer Science and Engineering Building, which creates a new facility complete with academic classrooms, labs and student-faculty interactive space, could begin construction as soon as August 2016 and be completed as soon as July 2017.
In Conclusion
Colorado Mesa University is one of Colorado’s premiere institutions of higher education, with a tri-partite mission in providing baccalaureate and graduate programs as a state-wide institution, as a regional community college and as a county-wide provider of vocational programs.

The new 87,500 sf CMU Computer Science and Engineering Building will provide critically needed state-of-the-art academic instruction space, including laboratory spaces to support undergraduate and future graduate level engineering coursework across multiple disciplines (civil engineering, mechanical engineering and computer engineering and computer science), space for the John McConnell Math & Science Center of Western Colorado to continue its work with Mesa County K-12 students, student-faculty interactive spaces for both the Engineering Program and Computer Science Department in direct response to Colorado Mesa University’s expansion of existing programs and adaptable academic laboratory space needs. Increased interest in new programs, night and evening classes and graduate programs, as well as steady growth in student enrollment and higher retention rates have made Colorado Mesa University the Western Slope’s choice institution of higher education. This project is fully consistent with CMU’s Institutional Master Plan and the 5-year Capital Improvement Plan.
Site 1 is located at Hall Avenue. Requires a single lot acquisition for full site. This site requires no additional property acquisition, although will require closing Hall Avenue from the east.
Site 2 is located between Elm and Kennedy Avenues. This site requires acquisition of two lots for full site.
Site 3 is located between Bunting and Glenwood Avenues. This site requires acquisition of two lots for full site.
Program Description, Needs, Trends and Deficiencies

The CMU Computer Science and Engineering Building is required to provide the necessary quality and quantity of academic instruction space for Colorado Mesa University’s growing enrollment, both overall and particularly to meet the diverse space needs within the Engineering Program and Computer Science Department and allow for the future creation of a Department of Engineering.

As of the Fall 2015, Colorado Mesa University will have an overall projected deficit of three classrooms, three academic and one open laboratory to meet the space needs of the engineering programs. The specific space needs for the Engineering programs, Computer Science Department, and John McConnell Math & Science Center of Western Colorado are defined in the next section.

Engineering Program

For the engineering program, a new facility is essential to the long-term feasibility of growing a burgeoning new program for mechanical engineering into a program that includes civil and computer engineering and to build partnerships with the Computer Science Department and its robotics program. Currently, in order to accommodate the growing engineering program space needs, academic instruction is limited in the existing Archuleta Engineering Center from 8 am to 2 pm. The existing Archuleta Campus facility provides 24,000 sf of academic classrooms, labs and support space.

The partnership program with CU-Boulder was formed in 2008 with a total full time equivalent (FTE) enrollment of 365. As of summer 2015, expected total enrollment for undergraduate coursework for Fall 2016 is 412 FTE. As the CMU population grows and more students choose the engineering program, it is anticipated that program will diversify beyond the mechanical engineering discipline to civil and computer engineering. This will place additional pressure on the limited space available to the programs. It is expected that pent up demand pegged to student population growth will indicate an immediate demand for even greater program diversity.

Between 2010 and 2014, the engineering program saw a 228% increase in enrollment. Graduation rates have more than doubled from 10 to 23. With continued enrollment growth, projections for graduates in 2020 are for 35 graduates in mechanical engineering alone. The program’s success has the allowed for growth to meet economic demand for graduates. Of the 59 graduates to date in the CU-Boulder/CMU Mechanical Engineering Partnership Program (49 graduates) and the CMU Applied Mechanical Engineering Program (10 graduates):

- 15% are working in engineering jobs in Colorado (outside the valley). Employers include: Applied Design, Flexpipe, Gordon Composites, CEA Medical Manufacturing, Knott Laboratory and Williams Energy.
- 24% are working in engineering jobs nationally. Companies include: Abbott Labs, Baker Hughes, Calphalon-Newell Rubbermaid, Exxon Mobile, Halliburton, Kiewit, Lawrence Livermore Labs, PhotonWorks Energy, Shell Oil and Solar Turbines.
- 11% are either continuing with school or are not currently working in an engineering field.

Computer Science Department

Between 2009 and 2014, Computer Science Department has grown from 106 to 140 students, a 131% increase. The Department has enjoyed dedicated facilities housed in the Wübben Science Building. The Computer Science Department has utilized both academic instruction and open lab space. The CMU Computer Science and Engineering Building project allows the program access to a greater diversity of space, allows access to a dedicated laboratory area, is more conducive collaborative work space for building relationships and projects with the engineering programs and also provides space for student projects and related storage.
Much of the existing facility used by the Computer Science Department today is general use academic classrooms, computer labs and general instructional labs. These spaces would need to be replicated in a new facility, although special focus should be spent on researching trends in the discipline and its relationship to engineering programs so that changing space needs can be discussed and planned for. With continued enrollment growth, projections to 2020 indicate a graduating class size of 48 computer science majors and seven to 10 minors.

Once the Computer Science Department vacates space in the Wubben Science Building, space currently used by Computer Science will serve as growth space for the Department of Math and Statistics and Department of Physical and Environmental Sciences.

**John McConnell Math & Science Center of Western Colorado**

In September of 2015, CMU was approached by the local John McConnell Math & Science Center to see if they could partner with the university to co-locate their center with CMU. The John McConnell Math & Science Center of Western Colorado is a world-class center that integrates teaching and hands-on excitement into a Science, Technology, Engineering and Math learning environment encompassing students, educators, families and community. Its mission is to create lasting excitement for math and science for students, teachers and community by

- Offering creative hands-on experiences for students,
- Developing and providing resources for classroom use,
- Providing training for educators and
- Developing innovative programs in science, technology, engineering and mathematics.

After reaching about 5,000 students per year from the car, the Math & Science Center obtained approximately 12,000 sf space in the New Emerson Schools. Over 68,000 students on scheduled field trips, and many families have visited since the Center opened in January 2000 and the Math & Science Center have outgrown their space. The Math & Science Center has therefore approached CMU to co-locate their center with CMU’s Computer Science and Engineering programs in 19,500 sf space. CMU therefore plans to incorporate the John McConnell Math & Science Center as an element of the CMU Computer Science and Engineering Building.

The John McConnell Math & Science Center offers a number of programs to encourage STEM learning. (1) Exhibition space: the “hands-on science” museum houses a large and ever-changing inventory of exhibits that demonstrate the principles of life, earth, and physical science. (2) The Math & Science Center offers an ever expanding program of formal and informal educational and enrichment activities targeted to K-12 age children and their families, university students and adult learners. (3) Elementary Science Unit Curriculum and Resource Kits: in 2012, the Center undertook the very ambitious task of creating and distributing elementary science resource kits for every science unit that is taught as part of the Mesa County Valley School District 51 “Year-At-A-Glance” integrated pacing guide for grades K – 5. Based on teacher feedback and changes in the district’s programming, the kits have been revised and updated each year, and are currently in their 4th iteration for the 2015-2016 school year. During the 2015-2016 school year, the elementary science resource kits are benefitting more than 10,000 students and their teachers in 27 District 51 and affiliated charter elementary schools. (4) School Field Trips: MASC has been a popular destination for School District 51 field trips since 2009. (5) STEM Programs in Classroom Settings. (6) Energy Science & Policy Program: for three years, the Math & Science Center’s Energy Science & Policy Program (ESP program) engaged academically high performing Mesa County high school students in a study of an important science-based policy issue (energy). Partnerships with regional technical and policy experts, area businesses, academic institutions, and governmental entities, and provided face-to-face and hands-on opportunities for the students to explore the scientific, technical, economic, political and cultural aspects of the global and local energy economy. (7) Informal Education such as after-school programs, camps, community events, Family Science Nights, Saturday Science Hour, Changing Landscapes of Science” seminar series, regional outreach programs, STEM Fellows Program.
Not only will this contribute to CMU’s mission to serve the university’s 14-county region by bringing more math and science to students K-12 through the engagement with sophisticated hands-on experiments and interactive presentations, but it will also provide opportunities for university students to volunteer, mentor and will provide a fantastic avenue for future K-12 teachers to receive hands-on experience. The Fellows program started in 2009 as an effort to provide undergraduate science and engineering students an opportunity to design and conduct programs for STEM learning and enable MASC to expand programs and reach. The program started slowly with only 2 students for the first two years and expanded significantly in 2011 with the relationship between MASC, CMU and the University of Colorado (engineering program at CMU conducted by CU) who have a standing memorandum of Understanding defining the Fellows program. The students involved in this program are primarily Colorado Mesa University, although students from other institutions are hired to work during the summer. These students (STEM Education Fellows) are science, engineering, computer science, math or teacher education majors, who share their knowledge and experience with each other and with elementary and middle students in many of the programs conducted by the Math & Science Center. They are paid stipends for their work and receive training in inquiry-based education pedagogy, classroom management, and presentation skills. Since its inception 46 Fellows have worked in the program from a variety of science and engineering disciplines and most recently teacher education.

General Academic Space Demands
In addition to the space demands of the previously mentioned two departments, there are general academic space demands that will not be met in the upcoming year. The requested Academic Quad Classroom, to be accommodated in the CMU Computer Science and Engineering Building, is designed to support both general and specific classroom needs. CMU is engaged in a multi-year review of its general education curriculum. A key element in the revision is the delivery of a team-taught, three-credit-hour, general education capstone course – the Maverick Milestone – for students who are mid-way through their program requirements. This course will require students to integrate what they have learned from their various general education courses. This specific course, within the general education curriculum, is designed to address one of the goals of CMU’s general education:

> Integrative Learning is a critical component of the Essential Learning Curriculum. Colorado Mesa University graduates make connections between disparate ideas using a variety of ways of knowing, a skill that enables them to solve the numerous unscripted and unstructured, complex problems they encounter in their personal, professional and civic lives. Key integrative learning experiences at CMU are the Maverick Milestone and Essential Speech courses.

More specifically, the course delivery is currently envisioned to create two 30-student class sections that will meet in a combined 60-student grouping, once weekly. The discussion will involve integrating curriculum by looking at an issue from multiple disciplines (e.g., Ethics and Health Care might involve a nurse educator and a philosophy faculty member; the History of Disease could be taught by faculty from Biological Sciences and History; Politics and Power could be discussed by a Political Scientist and Business faculty member). Students will meet in their individual sections for further discussion among the other two regularly scheduled weekly time blocks.

The space will also be used to address the Milestone course’s one-credit co-requisite: Essential Speech. CMU has adopted both written and oral communication as one of its student learning outcomes and the Essential Speech course is designed not only to support students in strengthening this expectation, but also to support further curriculum integration as students will not be limited in how they combine the speech and milestone courses. Offered on the intervening Tuesday/Thursday mornings, the spaces would be booked throughout the week.

Based on current projections, approximately 25 sections of 30 students each would be scheduled each semester, totaling an estimated 1,500 students in an academic year. When not scheduled for these specific uses, the classroom space will be assigned for other instruction, but the flexibility of the Academic Quad Classroom will make it a highly efficient use of space not currently available on the CMU campus.

Educational Benefits
The primary benefits of the projects will be to:

- provide uniquely designed academic instruction space to meet the needs of diverse and growing program areas,
- tailor space designs to the needs of 21st Century students and faculty,
- equip each space with advanced technologies to maximize instruction flexibility and
- locate faculty near and academic instruction spaces to further enhance student-faculty interaction and collaboration.

Each of these academic instruction spaces, from academic classrooms to instructional laboratories, will be organized and equipped as state-of-the-art learning environments in support of the Strategic Guideline’s Goal 4. An Academic Quad Classroom will be designed within a combined four-classroom configuration from spaces included within this request. It will have a flexible seating arrangement and will be equipped with digital projection, multiple whiteboards, voice amplification and connection to campus data and intranet services. In addition, the room will be equipped with overhead operable partitions allowing the room to be easily and quickly reconfigured from four 30-seat classrooms, to two 60-seat classrooms, or to a single 120-seat configuration.

Engineering instruction space will be equipped for several class types, with necessary voice amplification, lab surfaces, acoustically absorptive surfaces and low maintenance materials. Smaller, contained spaces will have robust mechanical systems that are low volume, high flow to minimize noise and maximize air changes. For occupational health and safety, a dedicated dust collection systems will be included in the machining and manufacturing lab and any other teaching or research lab. Larger volume spaces, including the open and research laboratories will be designed to support multiple program needs and anticipate future utilities requirements. Engineering and computer science program space will need to be outfitted with 3-phase power available in multiple locations within each of the ten labs. Water and sinks should be provided in each lab. Overhead arrays of power and data will be required to accommodate the needs of adaptable lab configurations. Computer Sciences will require a dedicated network rack and secondary network support to two labs. The John McConnell Math & Science Center will mostly need a large space to accommodate their activities and installations, with a bit of administrative space as well.

Campus Benefits

The campus will benefit by:

- Expansion of academic instruction spaces to allow the Engineering Program to meet growing demand and support academic space needs.
- Expansion of academic instruction space allows the creation of new engineering disciplines to support job creation.
- Diversifying academic instruction space types for the Computer Science Department and Engineering Program.
- Locating much needed academic support and instruction spaces adjacent to programs, unifying current on and off-campus programs.
- Reducing load on other buildings that are currently supporting these programs growing academic space needs.

Relation to Academic or Instruction Strategic Plans

Colorado Mesa University has experienced more that 50% enrollment growth since FY 2008. The campus has spent the last five years designing and constructing facilities to meet the demand. When CMU created its last Facilities Master Plan in 2010, CMU expected a maximum FTE of 4,800 by 2020. CMU has exceeded this maximum FTE and had reached 6,598 FTE in FY 2013.

Relation to Other Programs or Agencies

The program planning process has completed its analysis of space needs and offers a review of institutions with engineering and math programs, which typically include computer sciences. As a caveat, many of these programs are larger, well-established programs at a diverse set of higher education institutions across the US that may be peers of the University of Colorado Boulder. While many similarities can be drawn to the CMU program, there will be marked differences. These include the need for a larger space allocation per student,
as there will still be the demand for support facilities such as an engineering machining and manufacturing shop, engineering test facility, technician’s office – all of which will not be shared with a much larger academic facilities as noted by peer institutions.

In July 2015, the Program Planning team is analyzing historic data on program growth, program expansion plans and correlating this information with peer institution data to allow for an accurate project of space needs. At this point, the program plan includes the following space allocation estimate, built on a projected student enrollment based on CMU enrollment growth and graduation trends.

**Program Alternatives**

CMU’s drastic increase in enrollment (more than 50% since FY 2008) has forced the university to be very proactive in planning new academic instruction space to meet demand. A side effect is making that every department has had limited access to appropriate teaching spaces been limited either in the correctly sized or designed spaces, which means it is increasingly difficult to fulfill the university mission.

The following attributes, attainable with new space, are considered essential to these programs:

- Provide uniquely designed academic instruction space to meet the needs of diverse and growing program areas.
- Tailor space designs to the needs of 21st Century students and faculty and each academic program.
- Equip each space with advanced technologies to maximize instruction flexibility.
- Locate faculty near academic instruction spaces to further enhance student-faculty interaction and collaboration.
- Implement controlled natural daylighting, green materials and other sustainable building practices aligned with established LEED (Leadership in Energy and Environmental Design) or Green Globes criteria to reduce maintenance and long term energy costs.

### ASF per Student

<table>
<thead>
<tr>
<th>Colleges of Engineering and Mathematics</th>
<th>ASF per Student</th>
<th>Student FTE</th>
<th>TOTAL ASF</th>
<th>Dept Rooms</th>
<th>Total Labs</th>
<th>Office Conf</th>
<th>Study</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Aspirants</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>University of Michigan - Ann Arbor</td>
<td>110</td>
<td>7,304</td>
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<td>9</td>
<td>49</td>
<td>42</td>
<td>1</td>
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<tr>
<td>Pennsylvania State University - State College</td>
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<td>39</td>
<td>30</td>
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<td><strong>Aspirants Average</strong></td>
<td><strong>147</strong></td>
<td><strong>4,815</strong></td>
<td><strong>602,084</strong></td>
<td><strong>3</strong></td>
<td><strong>79</strong></td>
<td><strong>53</strong></td>
<td><strong>6</strong></td>
<td><strong>6</strong></td>
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</table>

| Peers                                   |                |             |           |            |            |             |       |       |
| University of Connecticut - Storrs      | 165            | 1,440       | 237,704   | 2          | 97         | 57          | 2     | 7     |
| University of Delaware - Newark         | 140            | 1,648       | 230,698   | 2          | 81         | 41          | 1     | 16    |
| Kansas State University - Manhattan     | 91             | 2,771       | 257,900   | 0          | 67         | 22          | 1     | 2     |
| Oklahoma State University - Stillwater  | 112            | 3,059       | 342,012   | 5          | 57         | 32          | 3     | 15    |
| University of Rhode Island - Kingston   | 123            | 1,021       | 125,276   | 3          | 63         | 38          | 2     | 17    |
| Boston University                       | 121            | 1,480       | 179,802   | 1          | 65         | 51          | 1     | 4     |
| Cornell University - Ithaca             | 206            | 2,701       | 555,854   | 18         | 90         | 78          | 3     | 17    |
| Michigan State University               | 123            | 2,230       | 274,635   | 2          | 70         | 40          | 0     | 12    |
| North Carolina State University         | 114            | 4,814       | 546,858   | 10         | 60         | 38          | 1     | 4     |
| Purdue University                       | 75             | 7,940       | 594,119   | 0          | 44         | 28          | 0     | 2     |
| **Peers Average**                       | **127**        | **2,910**   | **333,986**| **4**      | **69**      | **43**       | **1** | **10** |

In July 2015, the Program Planning team is analyzing historic data on program growth, program expansion plans and correlating this information with peer institution data to allow for an accurate project of space needs. At this point, the program plan includes the following space allocation estimate, built on a projected student enrollment based on CMU enrollment growth and graduation trends.
### III FACILITIES NEEDS

#### Total Space Requirements and Analysis

<table>
<thead>
<tr>
<th>Engineering</th>
<th>28,570</th>
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<tbody>
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<td>Administration Office</td>
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<tr>
<td>Reception</td>
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<td>Copy/Mail/Workroom</td>
<td>280</td>
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<tr>
<td>Conference Rm</td>
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<tr>
<td>Student-Faculty Interactive Spaces</td>
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<tr>
<td>50-seat Classroom</td>
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<td>35-seat Classroom</td>
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<td>24-seat Classroom</td>
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<tr>
<td>Materials Testing Lab</td>
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<td>Fluid Lab</td>
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<td>Project's Storage Area</td>
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<td>First Year Project's Lab</td>
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<td>Senior Project's Lab</td>
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<td>Electronics Lab</td>
<td>1,200</td>
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<tr>
<td>Machining &amp; Manufacturing Shop incl. secure tool crib for distribution</td>
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<tr>
<td>Mechanical Engineering Teaching Lab</td>
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<table>
<thead>
<tr>
<th>Computer Science</th>
<th>11,560</th>
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<tbody>
<tr>
<td>Administration / Reception</td>
<td>240</td>
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<td>Copy/Mail/Workroom</td>
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<td>Conference Room</td>
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<tr>
<td>Student-Faculty Interaction Spaces</td>
<td>1,800</td>
</tr>
<tr>
<td>Computer Science Lab - small</td>
<td>800</td>
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<tr>
<td>Computer Science Lab - large</td>
<td>1,200</td>
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<tr>
<td>35-seat Classroom</td>
<td>700</td>
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<tr>
<td>Robotics Lab incl project stor &amp; equipment</td>
<td>1,200</td>
</tr>
<tr>
<td>Project’s Lab</td>
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<table>
<thead>
<tr>
<th>John McConnell Math &amp; Science Center</th>
<th>12,480</th>
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</thead>
<tbody>
<tr>
<td>Administration Office</td>
<td>120</td>
</tr>
<tr>
<td>Reception</td>
<td>240</td>
</tr>
<tr>
<td>Copy/Mail/Workroom</td>
<td>280</td>
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<tr>
<td>Student-Faculty Interaction Spaces</td>
<td>1,440</td>
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<tr>
<td>Restrooms</td>
<td>180</td>
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<tr>
<td>Math &amp; Science Lab</td>
<td>4,900</td>
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</table>

<table>
<thead>
<tr>
<th>Academic Support</th>
<th>3,160</th>
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<tbody>
<tr>
<td>Group Study Rooms</td>
<td>120</td>
</tr>
<tr>
<td>Large Group Study Rooms</td>
<td>480</td>
</tr>
<tr>
<td>Makerspace Lab general use students projects lab</td>
<td>1,200</td>
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<tr>
<td>Lobby</td>
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<table>
<thead>
<tr>
<th>Building Support</th>
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<tbody>
<tr>
<td>Loading Dock</td>
<td>548</td>
</tr>
<tr>
<td>Cylinder Storage</td>
<td>100</td>
</tr>
<tr>
<td>Equipment and Supplies Storage</td>
<td>400</td>
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</tbody>
</table>

| Net SF Total | 56,818 |
| GSF Total @ 65% net/gross ratio | 87,500 |

CMU Computer Science and Engineering Building 12
Site, Civil and Landscape Narrative
The most important consideration in the selection of one of these sites is the overlay of existing site conditions. All the sites have demolition and site utilities vacation to complete within the scope of the project. Selection of a site will be dependent on a variety of factors, including the relationship of this building to facilities utilized by students and faculty and long-range campus planning goals.

Each of the three potential sites lie west of the central campus core. The campus has acquired significant properties west of the main campus core in an effort to expand the campus west of Cannell Avenue. Each of the three potential project sites include acquired parcels, many of which have been cleared of original structures and are prime for re-development.

Site development must comply with State of Colorado Building Code and in coordination with the local Fire Marshall. Each site has existing, City of Grand Junction sidewalks and local roads which serve as emergency vehicle access. Each of the three sites are adjacent to university developed surface parking west of Cannell Avenue.

There are utilities to serve the proposed facility at each site. Utilities, including invert elevations, for existing storm and sanitary sewer lines, shall be verified early in the design process.

No additional parking is anticipated with this project. Additional parking loads associated with this facility will be accommodated by lots adjacent to the project. Maximizing use of existing parking lots and encouraging alternative transportation aligns with campus master planning efforts and is geared towards a more pedestrian oriented, sustainable campus.

Structural Considerations
The first level floor of the project will be concrete slab on structural fill as required and the foundations will be concrete grade beams on either driven steel piling or screw piles. Structural slabs need to be planned to accommodate the equipment loads and vibration requirements of laboratory occupant and program needs.

Mechanical Narrative
The mechanical systems for the proposed CMU Computer Science and Engineering Building balances the building usage requirements with factors such as first cost, sustainability, operating costs and system reliability. The project will likely be heated and cooled by ceiling-mounted, water source heat pumps that are connected to the campus central loop fluid circulation system through a primary-secondary arrangement. Roof-mounted, air-to-air heat recovery units are used to pre-heat/pre-cool the incoming outside air for ventilation. These units draw relief air from the space and discharge to the outside. The treated outside air is then ducted to the ceiling-mounted heat pump units to mix with the return air.

Design Conditions:
Winter: Outdoor temperature 11 ° F.
Indoor temperature 70° F.

Plumbing System:
• Water service: A 2" or 3" water service is proposed from the 6" main.
• Backflow Prevention: two reduced-pressure type backflow prevention is provided at the water service to the building.
• A water meter is provided at the domestic water service entrance to the building.
• A roof drainage system is proposed, connected to site storm water piping.
• A 4” sanitary waste line exits the building near the southwest corner and connects to the existing main line
Fire Protection System:

- The building will be served with a wet-pipe type fire protection system, hydraulically designed to provide coverage per NFPA 13. Sprinkler coverage will be Light Hazard, except in storage rooms and mechanical / electrical rooms, will require Ordinary Hazard, Group 1 coverage.
- The fire service will be 4" or 6" diameter, with service entry consisting of a double-check type backflow preventer, fire department connection and flow/tamper switches as required by NFPA 13.

Electrical Narrative

Basic aspects of the electrical construction requirements for the proposed project include the following:

Power:

- Initial load estimates are based upon 10-Volt-Amperes (VA) per square foot (sf).
- This conservative estimate was used in initial equipment sizing. During design this will be replaced with calculations based upon actual equipment installed. Service equipment will be rated 480Y/277V, 3-phase, 4-wire, 600-Amp. Most lighting will be fed at 277-volts. Large motors will be fed at 480-volts, 3-phase.

Lighting:

The lighting system will consist of a combination of the most economical recessed fluorescent or LED lighting, direct/indirect pendants and specialty accent lighting at limited locations. Since Colorado Mesa University’s recently energy audit they use a 28 watt T8 fluorescent lamps.

Motion sensors for control are required by the energy code and dimming will be used where it complements the educational process. Light fixtures in common areas will be architecturally driven.

The lighting design shall follow Illuminating Engineering Society of North America guidelines.

Illumination Levels:
Based on recommendations from the Illumination Engineering Society of North America, (IESNA), interior illumination levels will be as follows (‘fc’ represents foot candles):

- Offices, Classrooms, Labs: ................................. 50 fc
- Corridors and hallways: ...................................... 10 fc
- Mechanical and electrical rooms: ................. 30 fc
- Other rooms: ................................................... 30 fc

Telecommunications:

Telecommunications services for the building will be connected to the campus telecommunications distribution systems. Services will consist of telephone and high-speed data.

Project Budget

Colorado Mesa University is requesting $32,805,723 spending authority from the State of Colorado to fund the CMU Computer Science and Engineering Building. Colorado Mesa University will provide a cash match of 28.4% of $9,322,516. The summary of the CMU Computer Science and Engineering Building project budget is as follows:
### A. Land Acquisition

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Land /Building Acquisition</td>
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### B. Professional Services

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<td>Master Plan/PP</td>
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<tr>
<td>Site Surveys, Investigations, Reports</td>
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<tr>
<td>Architectural/Engineering/ Basic</td>
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<td>Services</td>
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<tr>
<td>Code Review/Inspection</td>
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<tr>
<td>Construction Management</td>
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<td>Advertisements</td>
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<td>Inflation for Professional Services</td>
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<td>Inflation Percentage Applied</td>
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<tr>
<td>Other (Copying/Reproduction)</td>
<td>$6,850</td>
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<td>Total Professional Services</td>
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### C. Construction or Improvement

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<td>Infrastructure</td>
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<tr>
<td>Service/Utilities</td>
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<td>Site Improvements</td>
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<tr>
<td>Structure/Systems/ Components</td>
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<tr>
<td>(a) New (GSF): 87,500 sf $252/GSF</td>
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<td>(b) Renovate GSF: $0/GSF</td>
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<tr>
<td>Design Contingency</td>
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<tr>
<td>High Performance Certification Program</td>
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<td>Total Construction Costs</td>
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### D. Equipment and Furnishings

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<td>Communications</td>
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<tr>
<td>Inflation Percentage Applied</td>
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<td>Total Equipment and Furnishings Cost</td>
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### E. Miscellaneous

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<th>Description</th>
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<tbody>
<tr>
<td>Art in Public Places=1% of State</td>
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<tr>
<td>Total Construction Costs (see SB 10-94)</td>
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</tr>
<tr>
<td>Annual Payment for Certificates of</td>
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<td>Participation</td>
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<tr>
<td>Relocation Costs</td>
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<tr>
<td>Plan Review and Building Permitting</td>
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</tr>
<tr>
<td>Other Costs [specify]</td>
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<tr>
<td>Other Costs [specify]</td>
<td>$-</td>
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<tr>
<td>Other Costs [specify]</td>
<td>$-</td>
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<tr>
<td>Total Misc. Costs</td>
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### F. Total Project Costs

<table>
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<tbody>
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### G. Project Contingency

<table>
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<tbody>
<tr>
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<tr>
<td>10% for Renovation</td>
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<tr>
<td>Total Contingency</td>
<td>$1,102,500</td>
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<tr>
<td>Total Budget Request [F+G(3)]</td>
<td>$32,805,723</td>
</tr>
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</table>
Exterior Materials
The new CMU Computer Science and Engineering Building will have a contemporary feel, yet materials and proportions will reflect the campus aesthetic guidelines. Because of a strong connection to the Grand Junction community in general and a desire to specifically respond to the adjacent residential community, the new building will express its academic focus within a limited 3-story volumetric form.

A dynamic and expressive building form can be employed here, one which relates to master planning efforts of the Western Campus Expansion Project. Current conceptual images of the facility indicate materials consistent with this area and include:

- Red-brown masonry used in combination with either cast-in-place or pre-cast concrete or with veneer masonry systems of contrasting color,
- Aluminum storefront and/or curtain wall systems with tinted low-e glass,
- Sun shading devices could be used on the south and west elevations to control natural daylight and heat gain and
- Pedestrian-friendly entrances, which connect to the pathway system and support the campus landscape plan.

Existing Campus Buildings / Context

Maverick Center

Dominguez Hall
Interior Materials
Interior materials proposed for the CMU Computer Science and Engineering Building project will be similar in nature to the existing Escalante Hall and will be further discussed during Schematic Design. Materials selection includes latitude for adjustment to accommodate price variation at the time of construction bidding. Durable and sustainable materials have been used for estimating purposes. The use of sustainable materials or materials with sustainable components shall be considered a priority. Interior wall framing materials will be designed with the need for future flexibility in mind.

- Office Wall Construction:
  Metal Studs with 5/8” impact resistant gypsum board to deck with sound batt insulation
- Office Flooring Options:
  Recycled and recyclable Carpet or Carpet Tiles
- Classroom Flooring Options:
  Linoleum – Forbo Marmoleum global 2 or equal
  Recycled and recyclable Carpet or Carpet Tiles
  Vinyl Composition Tiles
- Lab Flooring Options:
  Linoleum – Forbo Marmoleum global 2 or equal
  Recycled-content Sport Floor
  Vinyl Composition Tiles
  Special consideration given for areas with chemical use
- Hallway Flooring Options:
  Terrazzo
  Linoleum – Forbo Marmoleum global 2 or equal
  Carpet or Carpet Tiles
- Classroom Partitions and Gym/Hallway Walls:
  Metal Studs with 5/8” impact resistant gypsum board to deck with sound batt insulation
  Ground Face or Painted Concrete Masonry Units —sand filled cores where not reinforced
  Wood paneling and/or wood or stone base
- Acoustical wall panels should be considered for sound control and distribution
- Exterior Wall Construction, Interior Component:
  Insulated Steel Studs with 5/8” impact resistant gypsum board
  Insulated Metal stud furring over concrete systems w/ 5/8” impact resistant gypsum board
  Ground Face Concrete Masonry Units —sand filled cores where not reinforced
  Thermally Broken aluminum storefront and/or curtain wall systems with insulated, tinted low-e glass
- Restroom Walls:
  Metal Studs with Ceramic Wall Tile full height
- Restroom Flooring:
  Tile, including but not limited to: porcelain tile or polished stone
  Terrazzo
- Ceiling Systems:
  Acoustical Ceiling Panels in Suspended Grid System
  5/8” gypsum board on metal stud framing for articulated ceiling systems and soffits and restroom / janitorial ceilings

Health, Life Safety and Code Compliance Issues
This project will be designed and constructed in accordance with the latest edition of the approved building codes and standards that have been adopted by the State Buildings Programs as the minimum requirements.

Commencement of schematic design shall include review and compliance with the most current codes as adopted by State Buildings Programs.

Similar to other CMU academic buildings, this project will be Occupancy Group B (Business), which includes educational occupancies above the 12th grade. The new building will be a 87,500 gsf, 3-story structure, requiring a minimum of two exit stairs and toilet facilities on each floor.
Accessibility to and within the building will follow ICC/ANSI A117.1, providing handicapped access to all areas of the building.

**Existing Site Requirements**
The three potential sites for the new CMU Computer Science and Engineering Building have been identified in the Colorado Mesa University – Facilities Master Plan Amendment, adopted in 2002 and located west of Cannell Avenue.
SITE ALTERNATIVES
Three different campus site alternatives are considered for the proposed CMU-CU-Boulder Partnership Engineering Building.

SITE INFORMATION & ANALYSIS
Parcel address(es):
Site is located at Hall Avenue and would require the closing of Hall Avenue from the east. This site would be comprised of 6 parcels. All parcels have been acquired by CMU.

Development SF:
The square footage of site is 49,633 sf excluding streets, sidewalks, etc.

Pros:
Requires no additional property acquisition

Parcel acres:
Acreage is 1.14 excluding streets, sidewalks, etc.

Other:
Coordination with City of Grand Junction for Hall Avenue road closure and utility service modifications are required.

Cons:
None
SITE ALTERNATIVES

Three different campus site alternatives are considered for the proposed CMU-CU-Boulder Partnership Engineering Building.

SITE INFORMATION & ANALYSIS

Parcel address(es):
Site is located between Elm and Kennedy Avenues. This site would be comprise of seven parcels.

Parcel acres:
Acreage is 1.17 excluding alleys, sidewalks, etc.

Development SF:
The square footage of site is 50,881 excluding alleys, sidewalks, etc.

Other:
Coordination with City of Grand Junction for utilities modifications are required.

Pros:
Parcel aligns with central campus core open space and its use as the site for the Engineering Building allows for the continued creation of an east-west pedestrian mall and close coordination of academic and support facilities.

Cons:
Requires acquisition of two lots in order to assemble all seven parcels to realize a building at this location. Any existing structures will need to be demolished and any hazardous materials abated.
SITE ALTERNATIVES
Three different campus site alternatives are considered for the proposed CMU-CU-Boulder Partnership Engineering Building.

SITE INFORMATION & ANALYSIS

Parcel address(es):
Site is located between Bunting and Glenwood Avenues. Site is located between Bunting and Glenwood Avenues. This site will be comprised of 7 parcels.

Development SF:
The square footage of site is 51,102 excluding alleys, sidewalks, etc.

Pros:
Site is within walking distance of Wubbern Science Building.

Parcel acres:
Acreage is 1.17 excluding alleys, sidewalks, etc.

Other:
Coordination with City of Grand Junction for utilities modifications are required.

Cons:
This site requires acquisition of two lots in order to assemble all 7 parcels to realize a building at this location.
The project site is adjacent to existing structures on all sides and respects existing landscape materials, pathways, fire lanes and other site features that support the Campus Master Plan. Work will include:

- Demolition of any existing structures will be required for this project.
- Each site is relatively level. Storm drainage for the site will conform to City of Grand Junction requirements.
- All required utilities exist adjacent to each site and any existing utilities existing beneath the proposed building footprint will be vacated and removed as needed to conform to the building design.
- The new facility will support the campus framework of open space, circulation and buildings by supporting any camps master plan guidelines for open space in the foreground to the building entry and by reinforcing the campus scale and materiality established on the main campus.

The movable furnishings and fixed equipment total $2,215,383 as shown on the budget report above. These budgets were developed based on a thorough compilation of equipment and furnishings needs for each architectural space, not based on a pre-established cost per sf.

**Operating Cost**

Colorado Mesa University's operating budget will be impacted by this project. Utility, custodial and maintenance cost increases are anticipated; no additional support staff will be required. The estimated annual operating budget increase is:

- Custodial Supplies and Personnel $1.63/sf/yr x 87,500 = $142,625
- Utility Costs $1.18/sf/yr x 87,500 = $103,250
- Maintenance Supplies and Personnel $1.59/sf/yr x 87,500 = $139,125

$385,000

The university is prepared and has planned to accommodate this budget requirement and it will not affect state operating expenditures.

**Financial Analysis**

The CMU Computer Science and Engineering Building is a state funded project. The total project cost is estimated to be $32,805,723. Colorado Mesa University will provide a cash match of 28.4% or $9,322,516. The funding request for the renovation of the CMU Computer Science and Engineering Building.

**Project Schedule**

Project implementation is estimated at 16-18 months for design, construction and occupancy of the CMU Computer Science and Engineering Building, as shown below:

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<thead>
<tr>
<th>TASK</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
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<tr>
<td>Occupancy</td>
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</table>
Computer Science and Engineering Exterior

LEVEL ONE